Future of the Chemical Sciences

Preparing for an uncertain future

Scenarios for 2030

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ROYAL SOCIETY OF CHEMISTRY

To understand how the chemical sciences and chemists will improve and touch our everyday lives in 2030

Scope and focus: internal *and* external

- guide the community and the RSC by anticipating and planning for the **future**
- take more **proactive** decisions today
- develop the RSC **long-term** strategy

Why?

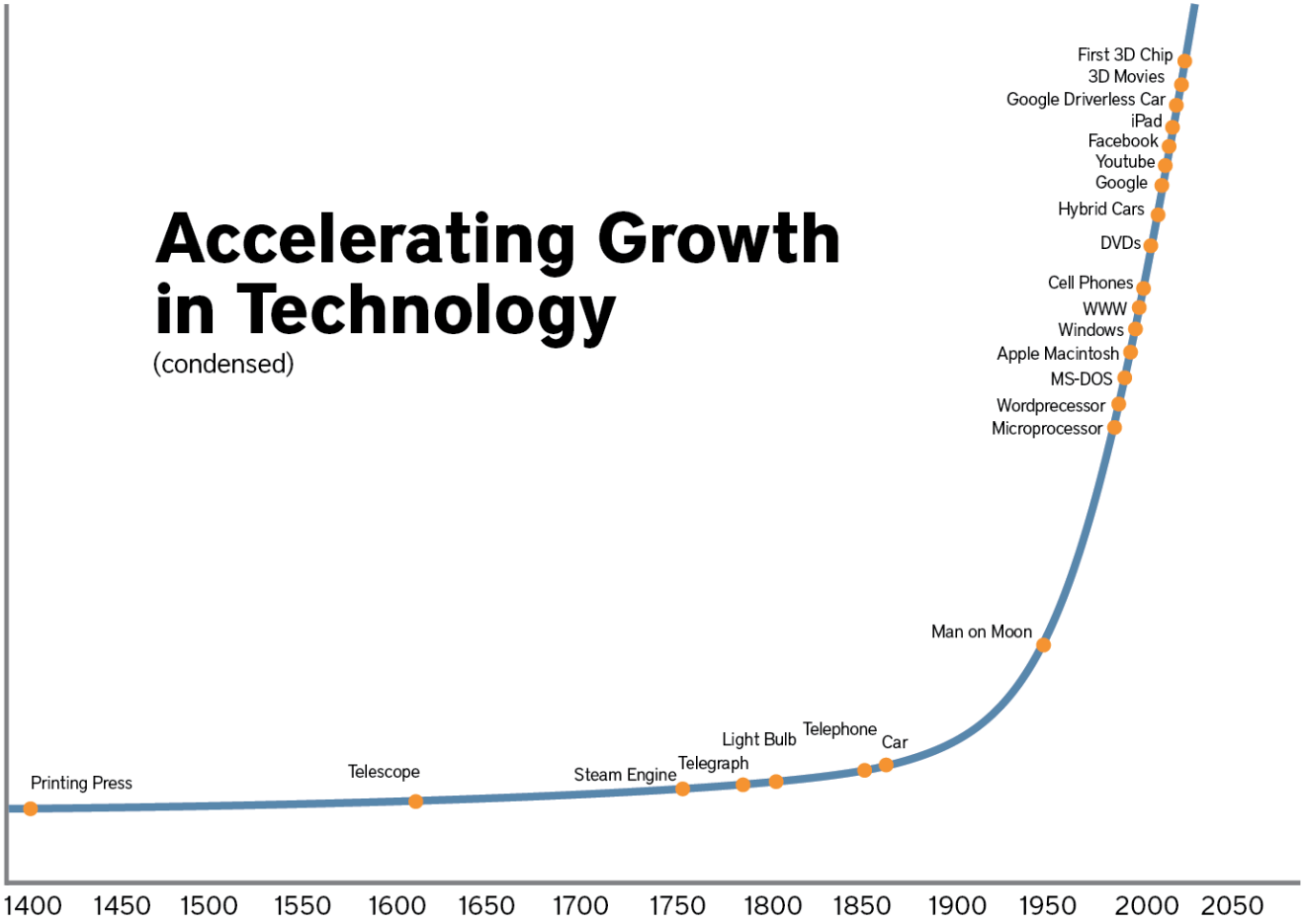
- The importance of being RELEVANT

Excellence isn't about maintaining the status quo

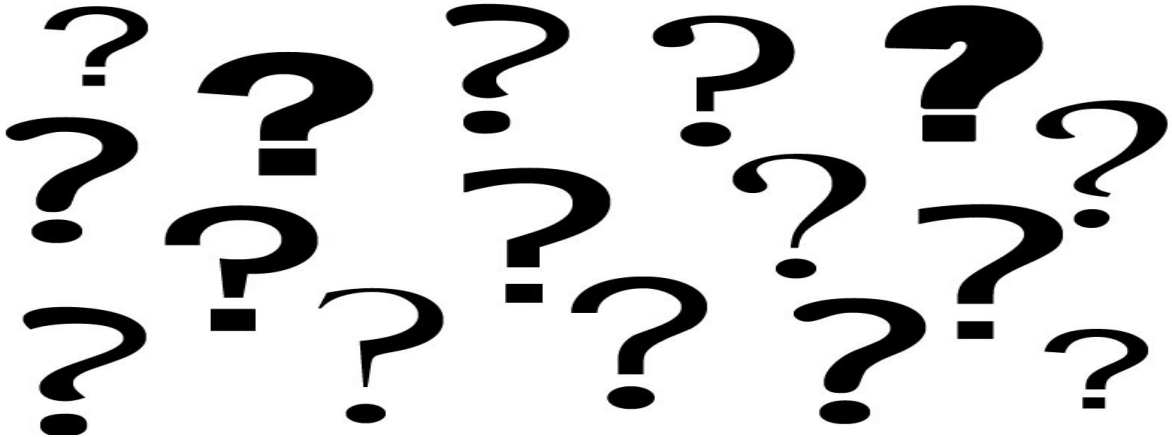
- TURBULENT times

Accelerating Growth in Technology

(condensed)



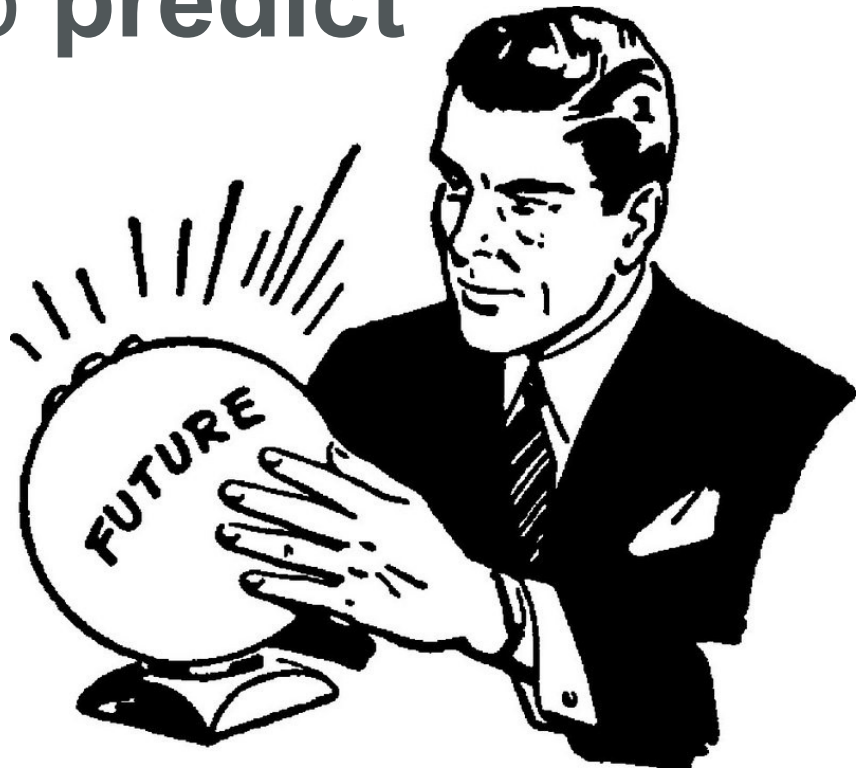
How?



- S & T evolve in unpredictable ways
- Scenario planning— identifying trends & needs

  good way to manage uncertainty

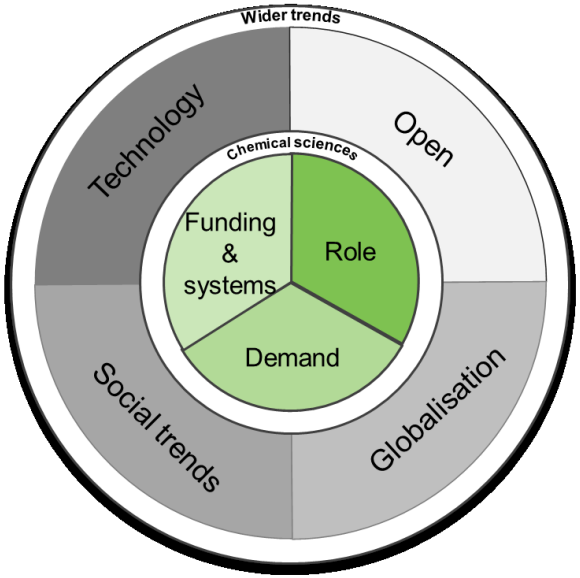
Preparing for the future rather than attempting to **predict**



FCS: a robust structured process

Phase I Engagement	Phase II Analysis	Phase II Emerging Trends	Phase III Scenarios	Phase IV Long-term Strategic Planning
Capture **big trends** shaping the world that could affect the world by 2030	Define **themes** of change in the chemical sciences & society	Identify "***emerging trends*** *and* ***drivers***" to challenge conventional thinking	Develop plausible **scenarios**, and understand implications	Consider **scenarios** against the **vision** we want, using our **strengths**

7 themes that may drive change



1. **The role of the chemical sciences** — essential & connected
2. **Future demand**—chemistry for impact
3. **Funding structures & Institutions** —the need for change
4. **Technology**—efficiency & innovation
5. **Open**—disruptive, inevitable & uncertain
6. **Globalisation *vs* Islandisation**—collaboration & competition
7. **Social trends**—changing workforce & public attitudes and interventions

Concerns about technology

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Technology

Stephen Hawking warns artificial intelligence could end mankind

By Rory Cellan-Jones
Technology correspondent

2 December 2014 | Technology

Prof Stephen Hawking, one of Britain's pre-eminent scientists, has said that efforts to create thinking machines pose a threat to our very

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Stephen Hawking, Elon Musk and others call for research to avoid dangers of artificial intelligence

4 plausible scenarios for chemistry

- Scenarios are pictures of the future

  … neither right or wrong…

- Scenarios must be useful

  … challenging

Scenario 1:
Chemistry saves the world

In this scenario, we explore what would happen to the chemical sciences if chemists solve some of the world's greatest challenges.

- Massive initiatives
- Chemists as leaders. Chemists and the cultural space.
- Incremental discovery
- Recognition of interdisciplinary achievements
- New interdisciplinary education
- Flourishing eco-system of start-ups

Scenario 2:
Push button chemistry

In this scenario we explore a world where the chemical sciences are automated and decentralised.

- Extraordinary technological developments
- Automation and remote access
- Self-employed chemists
- Chemistry goes underground
- New crowdfunding supporting innovation
- Difficult to regulate
- Entrepreneurial and virtual chemistry education

Scenario 3:
A world without chemists

In this scenario we explore a world without chemists.

- Chemistry brand disappeared
- Re-emerged as part of other disciplines
- Lack of awareness of chemistry
- No one wants to be a chemist
- Specific funding for chemistry
- Long-term teaching skills in chemistry in danger
- Discoveries from within other disciplines

Scenario 4:
Free market chemistry

In this scenario we explore a future without public funding for the chemical sciences.

- Many problems to solve
- Consumers of science become funders
- New philanthropy
- Education disconnected from research
- Teaching becomes virtual and applied
- Chemists not accountable to society
- Companies do more training-in-house

CHEMISTRY IDENTITY

Free market chemistry

MONEY

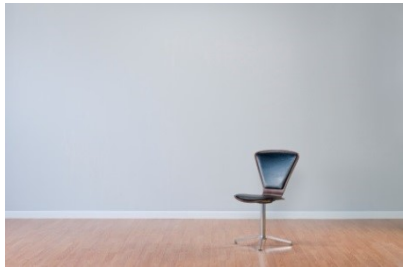
Chemistry saves the world

IMPACT

FUNDING

COMMUNICATION

A world without chemists



KNOWLEDGE

Push button chemistry

TRUST

For all plausible scenarios

- No easy funding for basic research and a greater proportion allocated to solving problems
- Chemists need to tell their success stories better and justify their value to funders and society
- Chemists need to work more closely with other disciplines and industries to be successful
- Chemistry needs leadership to develop a positive brand and impact on society

Questions for the future?

- What will happen to the **identity** of chemistry?
- Who will hold the power to **drive change** in chemistry?
- How **education** might need to change?
- What is the future of **scholarly communication**?
- How will **success** be measured?
- How can we **attract & retain** a diverse pool of talent?

- **How can we best serve the CHANGING NEEDS of SCIENCE and the WORLD?**

Linking **scenarios** to current & long-term strategies

- Influence strategic decisions
- Closer look at projects
- Challenge current thinking: *status quo*

The beginning of a process... revisit, review, test-check

rsc.li/futurechem